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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/878,187	06/12/2001	Toshio Morita	Q61610	1960

7590 07/13/2004

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EXAMINER	
LISH, PETER J	

ART UNIT	PAPER NUMBER
1754	

DATE MAILED: 07/13/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/878,187	MORITA ET AL.	
	Examiner	Art Unit	
	Peter J Lish	1754	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *03 May 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-5,13 and 15-17* is/are pending in the application.

4a) Of the above claim(s) *1-5* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *13 and 15-17* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

Applicant's arguments with respect to the rejection of the presently amended claims over Kyotani et al. have been fully considered and are persuasive. The rejection utilizing the reference to Kyotani et al. has been withdrawn.

Applicant's arguments with respect to the rejection of the presently amended claims over Harada et al. have been fully considered but they are not persuasive. As stated in the advisory action and in the office actions preceding it, the applicant argues that comparative example 1 of present application shows that high temperature heat treatment using a constant temperature furnace does not show a decrease of metal impurities to an amount within the range claimed by applicant. However, the only difference which examiner sees between Example 1 and Comparative Example 1 is the removal of the impurities from the inert gas. It is not seen how the removal of impurities from a gas after its contact with the carbon fibers affects the carbon fibers themselves.

Additionally, the argument that the comparative example in the specification of the instant application proves that high-temperature heat treatment performed other than by the method of example 1 results in a metal content of greater than 100 ppm is unpersuasive because the comparative example recites the destruction of the furnace in which the high-temperature heating takes place. It is expected that this not occur in the process of Harada et al., as the high temperature heating is of extreme importance to the overall teaching of Harada et al., and yet no mention is made to the destruction of the furnace. Therefore, the comparative example cannot be relied upon to determine the amount of metal impurity in the carbon fibers of Harada et al.

Harada teaches treatment of vapor grown carbon fibers identical to those of the applicant under equivalent temperatures and using the same carrier gas as the applicant. Where, as here, the claimed and prior art products are identical or substantially identical, or are produced by identical or substantially identical processes, the burden of proof is shifted to the applicant to prove that the prior art products do not necessarily or inherently possess the characteristics of his claimed product. See In re Best, 195 USPQ 430.

Furthermore, It is held that when the prior art discloses a product which reasonably appears to be either identical with or only slightly different than a product claimed in a product-by-process claim, a rejection based alternatively on either section 102 or section 103 of the statute is eminently fair and acceptable. The burden to show a different product is thereby shifted to the applicant, as the Patent Office is not equipped to manufacture products by the myriad of processes put before it and then obtain prior art products and make physical comparisons therewith. See *In re Brown*, 173 USPQ 685, 688 and *In re Fessman*, 180 USPQ 324.

Claim Rejections - 35 USC § 102/103

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 13 and 15-17 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Harada et al. (US 5,409,775).

Harada et al. teaches the treatment of vapor grown carbon fibers. The fibers are grown by a known method utilizing an iron or nickel catalyst, which results in fibers having a diameter of 5 microns or smaller, preferably from 0.3 to 2 microns, and a length of 90 microns or shorter. The treatment of Harada et al. comprises graphitizing the fibers by heating them at a temperature above 2,000 °C, preferably at a temperature above 2,800 °C, in an inert gas. While the catalyst metal impurity content of the graphitized fibers is not explicitly taught, it is expected that it be within the claimed range of the applicant because no difference which would result in a graphitized fiber having more or less metal impurities is seen between the process of Harada et al. and that of the instantly claimed invention.

It is additionally noted that the process limitations of claim 15 do not serve to further limit the claimed carbon fiber of independent claim 13.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 13 and 15-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tennent et al. (US 6,235,674) taken with Lambert et al. ("Improving conditions towards isolating single-shell carbon nanotubes").

Tennent teaches the vapor growth of carbon fibers, or multiwalled nanotubes, with diameters in the range of 0.1 to 80 microns using iron, cobalt, or nickel catalysts. Tennent additionally teaches that the fibers are treated under high temperature at 2500-3000 °C in order to convert the entire filament to highly ordered graphitic carbon. Regarding the length of the carbon fibers, official notice is taken that vapor-grown carbon fibers have lengths between 1 and 1000 microns. Tennent et al. does not explicitly teach that the graphitized carbon fibers have remaining catalyst metal impurities in an amount between 30 and 100 ppm.

Lambert et al. teaches a method of removing the metallic catalyst material that remains in vapor-grown carbon nanotubes. The method comprises heating the samples under vacuum at high temperatures, for example 1600 °C. Lambert teaches that since the vapor pressure of the catalyst particles is different to that of carbon, it must be possible to remove the catalysts from the samples. Lambert teaches that most of the catalyst was removed from the carbon nanotubes by the treatment.

It would have been obvious to one of ordinary skill at the time of invention to apply the treatment of Lambert et al. on the carbon nanotubes of Tennent et al. in order to obtain a purified nanotube product. It is expected that the resulting product will have remaining catalyst metal impurities in an amount between 30 and 100 ppm because no difference is seen between the process of Lambert et al. and that of the instantly claimed invention.

It is additionally noted that the process limitations of claim 15 do not serve to further limit the claimed carbon fiber of independent claim 13.

Claims 13 and 15-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tennent et al. taken with Colomer et al. ("Different purification methos of carbon nanotubes produced by catalytic synthesis").

Tennent teaches the vapor growth of carbon fibers, or multiwalled nanotubes, with diameters in the range of 0.1 to 80 microns using iron, cobalt, or nickel catalysts. Tennent additionally teaches that the fibers are treated under high temperature at 2500-3000 °C in order to convert the entire filament to highly ordered graphitic carbon. Regarding the length of the carbon fibers, official notice is taken that vapor-grown carbon fibers have lengths between 1 and 1000 microns. Tennent et al. does not explicitly teach that the graphitized carbon fibers have remaining catalyst metal impurities in an amount between 30 and 100 ppm.

Colomer et al. teaches a method of removing the metallic catalyst material that remains in vapor-grown carbon nanotubes. The method comprises stirring the nanotube sample into a solution of hydrofluoric acid to dissolve the metal particles. Colomer teaches that after treatment for 24 hours, filtering, and rinsing, the catalyst metal is completely eliminated from the carbon nanotube sample.

It would have been obvious to one of ordinary skill at the time of invention to apply the treatment of Colomer et al. on the carbon nanotubes of Tennent et al. in order to obtain a purified nanotube product. It would have been obvious to one of ordinary skill at the time of invention to carry out the treatment of Colomer et al. for any desired amount of time in order to yield a nanotube product having a desired amount of metal impurity, as doing so is seen to be the optimization of a known process, held to be obvious by *In re Boesch*, 205 USPQ 215.

It is additionally noted that the process limitations of claim 15 do not serve to further limit the claimed carbon fiber of independent claim 13.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Peter J Lish whose telephone number is 571-272-1354. The examiner can normally be reached on 9:00-6:00 Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stanley Silverman can be reached on 571-272-1358. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

PL

STUART L. HENDRICKSON
PRIMARY EXAMINER